

428 Rec'd PCT/PTO

09/486018

18 FEB 2000

Express Mail No.: **EL07377538US**Date: **February 18, 2000**

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**ANTONELLA FUSILLO**

(Name of person mailing paper or fee)

(Signature)

<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>		<b>Attorney's Docket No:</b> <b>BECKER-4</b>
<b>INTERNATIONAL APPLICATION NO.</b> <b>PCT/DE98/02448</b>	<b>INTERNATIONAL FILING DATE</b> <b>August 21, 1998</b>	<b>PRIORITY DATE CLAIMED</b> <b>August 21, 1997</b> <b>February 27, 1998</b> <b>March 2, 1998</b>
<b>TITLE OF INVENTION</b> <b>VERFAHREN UND VORRICHTUNG ZUM SPRITZGIESSEN VON SPRITZGUSSTEILEN AUS PLASTIFIZIERBAREM MATERIAL</b>		
<b>APPLICANT(S) FOR DO/EO/US</b> <b>HEINER BECKER</b>		

**Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:**

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☐ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ Original or facsimile of an oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11. to 16. concern other document(s) or information included:**

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.  
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ Other items or information:

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <div style="font-size: 1.5em; font-weight: bold;">09/486018</div>	INTERNATIONAL APPLICATION NO. <div style="font-weight: bold;">PCT/DE98/02448</div>	ATTORNEY'S DOCKET NO. <div style="font-weight: bold;">BECKER-4</div>
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17. <input checked="" type="checkbox"/> The following fees are submitted : BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):	
<div style="margin-left: 20px;"> <input checked="" type="checkbox"/> For filing with EPO or JPO search report (37 C.F.R. 1.492(a)(5))           </div>	<div style="margin-left: 20px;">\$ 840.00</div>
<div style="margin-left: 20px;"> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(1))           </div>	<div style="margin-left: 20px;">\$ 670.00</div>
<div style="margin-left: 20px;"> <input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(2))              but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2))           </div>	<div style="margin-left: 20px;">\$ 760.00</div>
<div style="margin-left: 20px;"> <input type="checkbox"/> Neither international preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(3))              nor international search fee paid to USPTO (37 C.F.R. 1.445(a)(2))           </div>	<div style="margin-left: 20px;">\$ 970.00</div>
<div style="margin-left: 20px;"> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 C.F.R. 1.492(a)(4))              and all claims satisfied provisions of PCT Articles 33(2)-33(4)           </div>	<div style="margin-left: 20px;">\$ 96.00</div>

Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		
Claims	Number Field	Rate
Total Claims	14-20	x \$ 18.00
Independent Claims	3-3	x \$ 78.00
Multiple dependent claims (if applicable)		x \$260.00
TOTAL OF ABOVE CALCULATIONS		\$840.00
Reduction by 1/2 for filing by small entity, if applicable. Verified small entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28)		
SUBTOTAL		\$840.00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date 37 CFR 1.492(f).		
TOTAL NATIONAL FEE		\$840.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +		
TOTAL FEES ENCLOSED		\$840.00
Amount to be refunded		
charged		

a. ☒ A check in the amount of **\$840.00** to cover the above fees is enclosed.

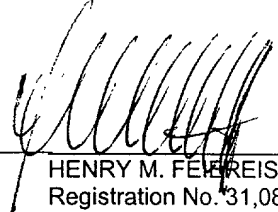
b. ☐ Please charge my Deposit Account No. **06-0502** in the amount of \$ \_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **06-0502**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

**Send all correspondence to:**

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 350 Fifth Avenue  
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 Date: February 18, 2000

  
 HENRY M. FEIEREISEN  
 Registration No. 31,084

30 MAY 2000

Applicant or Patentee: HEINER BECKER Attorney's Docket No.: BECKER-4  
 Serial or Patent No.: \_\_\_\_\_ Filed or Issued: \_\_\_\_\_  
 For: VERFAHREN UND VORRICHTUNG ZUM SPRITZGIESSEN VON SPRITZGUSSTEILEN  
AUS PLASTIFIZIERBAREM MATERIAL

**VERIFIED STATEMENT (DECLARATION CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b) SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ the owner of the small business concern identified below:  
☐ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: STRUCTOFORM SPRITZGIESSEN ANISOTROPER STRUKTURKOMPONENTEN GMBH  
 ADDRESS OF CONCERN: Jülicher Strasse 336  
52070 Aachen / Germany

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both. I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled VERFAHREN UND VORRICHTUNG ZUM SPRITZGIESSEN VON SPRITZGUSSTEILEN AUS PLASTIFIZIERBAREM MATERIAL, by inventor(s) HEINER BECKER as described in

☒ the specification filed herewith  
☐ application serial no. \_\_\_\_\_ filed : \_\_\_\_\_  
☐ patent no. \_\_\_\_\_ issued : \_\_\_\_\_

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or any nonprofit organization under 37 CFR 1.9(e). \* NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_  
☐ Individual ☐ Small Business Concern ☐ Nonprofit Org.  
 FULL NAME: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_  
☐ Individual ☐ Small Business Concern ☐ Nonprofit Org.

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are &p unishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Heiner Becker

TITLE OF PERSON OTHER THAN OWNER: \_\_\_\_\_

ADDRESS OF PERSON SIGNING: Reumontstraße 34, D-52064 Aachen, Germany

SIGNATURE Heiner Becker Date 15.03.2000

52070 Aachen

10 Rec'd P.C. 30 MAY 2000  
**PATENT**  
09/486,018

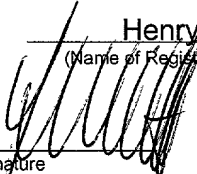
**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Docket No.: BECKER-4

In re Application of:	)
HEINER BECKER	)
Appl. No: 09/486,018	)
Filed: February 18, 2000	)
For: PROCESS AND DEVICE FOR INJECTION MOLDING, INJECTION MOLDED PARTS OF PLASTICIZEABLE MATERIAL	)

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231, on <u>May 25, 2000</u> . (Date)	
<u>Henry M. Feiereisen</u> (Name of Registered Representative)	
 Signature	<u>5/25/2000</u> Date of Signature

S I R:

Preliminary to the first Official Action in the above-entitled application,  
please amend the application as follows:

Page 1, line 3, add the heading --BACKGROUND OF THE INVENTION--.

Page 9, line 17, add the heading --BRIEF DESCRIPTION OF THE DRAWING--.

Page 14, after the heading "CLAIMS" and before the first claim add --What is claimed is:--.

**Amend** the following claims:

- 2

- 09486018-050300
3. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that] wherein the movement of the second plasticized material is generated through ultrasound.
  4. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that], and further comprising the step of providing an electromagnetic field [acts] to act upon the second plasticized material.
  5. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that] wherein the movement is generated by a melt pump.
  6. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that] wherein the second plasticized material is injected from two locations, at least partially at a same time, into the injection mold [(2)].
  7. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that], and further comprising the step of placing a sheet or a reinforcement fabric [is placed] before or after injection of the first plasticized material into the injection mold [(2)].

8. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that] wherein the first plasticized material covers only a portion of [the] a wall surface of the injection mold.
9. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that] wherein after partial filling of the injection mold [(2)] with the first material, a further region of the injection mold is opened by means of a slide gate for subsequent filling with the second material.
10. (Amended) [Process] The process according to [one of the preceding claims] claim 1, [characterized in that], and further comprising the step of injection at least a further plasticized material [is injected] before injection of the first plasticized material.
11. (Amended) [Adjustment] An adjustment nozzle destined for use in an injection molding device, [characterized by] comprising a body member having two interconnected outlets [(30, 31; 30', 31')] which are each provided with a check valve [(25, 25'; 26, 26')], with the check valves [(25, 25'; 26, 26')] operating in opposite directions.

12. (Amended) [Adjustment] In combination: an adjustment nozzle destined for use in an injection molding device, [characterized in that] wherein the adjustment nozzle [(20)] bears upon a surface [(24)] of the injection molding device and is secured by a flange.
13. (Amended) [Injection molding device] The combination according to claim 12, [characterized in that] wherein the adjustment nozzle [(31)] has various channels [(34, 35)] and is movably guided in a block [(30)], so that one of the [channel (34, 35)] channels of the adjustment nozzle [(31)] is in alignment with a channel [(32)] in the block [(30)].
14. (Amended) [Injection molding device] The combination according to [one of the claims 11 to 13] claim 12, [characterized in that] wherein the injection molding device has an injection mold [(2)] which is tempered with a metal alloy of low melting point.

## REMARKS

This Amendment is submitted preliminary to the issuance of an Office Action in the present application.

Applicant has amended claims 1 to 14 to present them in better form. In addition, applicant has amended the specification to provide proper headings.

When the Examiner takes this application up for action, he is requested to take the foregoing into account.

The Commissioner is hereby authorized to charge fees which may be required, or credit any overpayment to Deposit Account No. 06-0502.

Respectfully submitted,

By: 

Henry M. Feiereisen  
Agent for Applicant  
Reg. No. 31,084

Date: May 25, 2000  
350 Fifth Avenue  
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PROCESS AND DEVICE FOR INJECTION MOLDING, INJECTION MOLDED  
PARTS OF PLASTICIZEABLE MATERIAL

The invention relates to a process and device for injection molding of injection molded parts from plasticizeable material, with a first plasticizeable material being injected into an injection mold and hardening on the edge of the mold and subsequently a second plasticizeable material which differs from the first one is injected into the injection mold.

Such processes are known as "sandwich process" or "mono-sandwich process", and lead in the injection molded parts to an outer envelope and a core, whereby envelope and core are, preferably, made of different materials. The strength of such materials is impacted by the selection of the used materials and their strength.

The invention is based on the object to increase the strength of the injection molded parts made by known processes.

This object is attained by moving only the second plasticized material during solidification.

Movement of the material lead, on the one hand, to an increased strength, and, on the other hand, to a good bond between the first and second materials. It

will be understood in this context that the first and second materials may also be selected identical except for the applied temperature and other parameter. The invention permits manufacture of injection molded parts with completely new and novel properties.

Advantageously, the second plasticized material is injected through at least a second opening into the injection mold. Injection of material from both sides has the advantage that the plungers or screws used for injection of the materials can be timed relative to one another so that a movement is generated in the second plasticized material

Such a plunger arrangement also permits to move the second plasticized material in only one direction. A movement of the second plasticized material in one direction may also be implemented by means of a plunger and an overflow opening in the injection mold. So long as the injection mold has two openings, these openings may also be interconnected by a bypass so that the second plasticized material can circulate by using a suitable valve technique. The movement may, on the one hand, be generated by feed screws or feed plungers. On the other hand, it is also possible to provide a pump in the bypass.

In accordance with a preferred embodiment, the movement is generated through oscillation of the injection plunger or injection plungers. The oscillation does not cause a strong mass shift and has the advantage that the plasticized

material is aligned.

According to a variation, the movement is generated through ultrasonic. A movement in the injection mold can be generated even with ultrasonic for movement of solely the second plasticized material.

According to a further variation, an electromagnetic field acts upon the second plasticized material. Also in this way, the plasticized material is aligned.

In special fields of application, it is possible to generate the movement through injection of a fluid. The term "fluid" will denote, on the one hand, a gas, and, on the other hand, any liquid which is injected into the second plasticized material. Hereby, the fluid is utilized to push or shove the material. Hereby, the fluid can be used to generate one or more hollows in the injection mold. At the same time, the fluid remains advantageously inert during these events, and thus reacts only insignificantly with the melt.

According to a further variation, the movement is generated through a melt pump. For example, a gear pump which is used instead of a plunger, may generate a movement in one direction or a to-and-fro movement.

According to an exemplified embodiment of the invention, the second plasticized material is injected from two locations, at least partially

1 simultaneously, into the injection mold. Then, the material impacts on one  
2 location to produce there a seam which can or is especially hardened by the  
3 movement. This seam zone results in a particularly high strength, and it is  
4 proposed to position this seam zone in particularly stressed regions. The seam  
5 zone, which heretofore was positioned in less stressed regions as a  
6 consequence of its slight strength, has a strength increased by about factor 4  
7 because of the movement of the plasticized material during solidification. This  
8 advantage is not only limited to the sandwich-process but can be utilized in  
9 general in injection molding processes.

11 For example, incorporation of electronic circuits in an injection molded part  
12 can be realized by placing a sheet or a reinforcement fabric into the injection  
13 mold before or after injection of the first plasticized material. The sheet may  
14 include an electronic circuit, and the reinforcement fabric may be used to  
15 increase the strength. The inserted sheet may be made of different materials. A  
16 decorating sheet serves visual purposes. The sheet may, however, have  
17 particular chemical and/or physical and/or electric and/or thermal and/or optical  
18 and/or mechanical properties, as dictated by the particular application. A broad  
19 field of application includes sheets which include electric or electronic circuits  
20 generated in a photo-optical or galvanic manner. Reinforcement fabrics may  
21 include especially glass fiber fabrics, carbon fiber fabrics and/or an inherent fiber  
22 fabric whereby the inherent fiber fabric includes fibers of a material contained in  
23 the first plasticized material and/or the second plasticized material. The use of

such reinforcement fabrics or sheets is also advantageous per se in order to realize, on the one hand, desired properties such as look, strength or conductivity, and, on the other hand, high production rates during injection molding.

Hereby, in particular the inherent fiber fabric can be incorporated already aligned. Moreover, the process can be operated such that initially liquid melt is introduced for penetration of the fabric. Subsequently, the second material, for example a melt permeated with inherent fibers, can be introduced and, optionally, moved in accordance with the invention. In this way, a seam can be reinforced in a desired fashion.

The above-described application may also be used together with the above-described utilization of a fluid.

In accordance with a variation of the process, which is advantageous in many cases, the first material covers only a part of the wall surface of the injection mold. Thus, the injection mold has an outer wall of two different materials which may exhibit different colors. In this process, a shoulder in the mold is advantageously utilized to realize a defined transition between both materials.

1 According to an alternative, after partially filling the injection mold with a  
2 first material, a further area of the injection mold is opened by means of a slide  
3 gate and subsequently filled with the second material. Also the slide gate results  
4 in a defined transition of the first to the second material. Preferably, the slide gate  
5 is activated in dependence on the injection process - i.e. for example, the  
6 distance traveled by a feed screw, the time needed for the injection phase, or a  
7 pressure applied at the injection device or in the mold.

8  
9 According to a modification of the process according to the invention, at  
10 least a further plasticized material is injected before the first plasticized material.  
11 This results in a structure of the injection molded part of individual concentric  
12 layers, whereby depending on the process course, the plasticized material of  
13 certain layers can be moved. Moved and immobile layers may alternate, or it is  
14 also possible to introduce moving layers in sequence in the form of a layer cake  
15 to produce a particularly firm injection molded part.

16  
17 It is advantageous to provide the second plasticized material with a filler.  
18 Examples of fillers include fibers, particles, soot and metals. Examples of  
19 plasticized material include besides plastics also plasticizeable ceramics and  
20 plasticizeable powdered metal.

21  
22 Injection molded parts made according to the described process are  
23 suitable in view of their high strength as stabilizers, as strut shaft or cardan shaft

and as reinforcement sleeve (insert) for most different purposes. The parts are superior to absorb loads in particular tensile pressure as well as bending stress. The use of different materials, especially as first plasticized material, permits the production of lids or casings with seal, running rollers with hub and running surface, vibration damper footing, shock absorbers, coolant pipes with hard and soft zones, filter elements, clutch pedals or other pedals.

In particular the use of thermoplastic rubber as plasticizeable material enables the manufacture of hinges, whereby two or more solid plastic materials can be interconnected by a rubber piece. According to a preferred exemplified embodiment, harder thermoplastic materials are injected from both sides as first plasticized material to form two spaced-apart bodies. Subsequently, the distance between the bodies, and, optionally, an inner side, is filled with rubber material so that a hinge is realized between two plastic parts.

To attain the object, also an injection molding device with an adjustment nozzle can be used.

Practice has shown that the positioning of the adjustment nozzle between injection mold and injection molding device is oftentimes very time-consuming. This object is attained by positioning the adjustment nozzle of a typical injection molding device upon a surface and securing the adjustment nozzle with a flange.

Normally, the adjustment nozzle is threadably engaged in the surface of the injection molding device and during screwed attachment of the adjustment nozzle the distance of the nozzle end varies with respect to the injection molding device. This problem is eliminated by fixedly securing a flange, mounted to the adjustment nozzle, or a flange, placed over the adjustment nozzle, to the injection molding device, so that the adjustment nozzle can be affixed to the injection molding device in any position rotated about its axis. The described device is especially advantageous, in particular when the adjustment nozzle has several openings, which should be utilized alternately.

According to a further feature of the described device, the adjustment nozzle has different channels and is movable in a block, so that a channel of the adjustment nozzle is aligned with a channel in the block.

This hot runner block according to the invention, either permits to direct material plasticized by the adjustment nozzle through the hot runner block to the injection mold or to an extruder, or to terminate the introduction at a wall surface of the block and to implement a throughflow of the block from this extruder via a further channel of the adjustment nozzle. Also, different extruders may be operatively connected in this manner with an injection opening of the injection mold.



FIG. 2 shows the securement of an adjustment nozzle to an injection molding device;

FIG. 3 is a schematic illustration for circulation through an injection molding device;

FIG. 4 is a perspective illustration of a hot runner block with adjustment nozzle; and

FIG. 5 is a sectional view through the adjustment nozzle according to FIG. 4.

The injection molding device 1 shown in FIG. 1 includes an injection mold 2 with a mold cavity 3 having two openings 4 and 5. These openings 4 and 5 are each connected via branching conduits 6 and 7 with two feed assemblies 8, 9 and 10, 11 for plasticized material. The branching T-pieces 14, 15 permit alternating connection of a respective one of the feed assemblies 8 or 9, and 10 or 11 with the mold cavity 3.

Thereby, it is possible to feed plasticized material from two sides into the mold cavity 3 from the feed aggregates 8 and 11 and subsequently to direct another plasticized material through the feed assemblies 9 and 10 into the mold cavity 3.

Furthermore, plasticized material can be pushed initially from the feed assemblies 9 and 10 into the feed assemblies 8 and 11 and subsequently layered material is first pushed from one of the feed assemblies 8 into the mold cavity and then layered material is pushed from the other assembly 11 into the mold cavity, thereby realizing a quadruple layer arrangement in the mold cavity.

Furthermore, material introduced into the mold cavity 3 via one opening 4 can overflow, and overflow through the further opening 5 in another feed aggregate, or it may be pushed into a bypass 12. Furthermore, the pump 13 permits a circulating flow in the bypass 12 through the mold cavity 3.

Depending on the valve position at locations 14 and 15, the above-described processes can thus be realized.

FIG. 2 shows an adjustment nozzle 20 which has a flange for threaded engagement to an injection molding device 22. A stepped shoulder 23 on the adjustment nozzle 20 provides a precise fit of the adjustment nozzle 20 in an oppositely stepped shoulder 24 on the injection molding device 22. After placement of the adjustment nozzle 20 onto the injection molding device 22, the flange 21 is placed over the adjustment nozzle and screwed to the injection molding device 22 for securing the adjustment nozzle.

The adjustment nozzle 20 has an inlet on the side of the injection molding

device 22 as well as two outlets 30, 31 and 30', 31' on the mold side. Provided within the adjustment nozzle 20 are check valves 25, 26, and 25', 26' operating in opposite directions.

FIG. 3 shows one option to use such an adjustment nozzle. This allows to circulate the mold part 27 either in direction of the arrow 28 or in direction of the arrow 29. In this manner, layers of different alignment can be realized without any problems. It will be understood that also other flow paths through such a nozzle 20 can be implemented.

FIG. 4 shows a hot runner block 30 which interacts with a particular adjustment nozzle 31. The hot runner block has a through channel 32 and a central round opening 33 which intersects the channel 32 for receiving the nozzle head of the adjustment nozzle 31. This nozzle head has a bore 34 which extends transversely to the axis of the adjustment nozzle, with the bore corresponding to the diameter of the channel 32 and aligned with the channel 32 through counterboring the adjustment nozzle in the opening 33 of the hot runner block 30.

Above the bore 34, the adjustment nozzle 31 is provided with a L-shaped bore 35 which should also be aligned with the channel 32 and then connects the adjustment nozzle body 36 with the channel 32 to convey plasticizeable material from the adjustment nozzle body 36 through the L-shaped channel 35 into the channel 32.

The channel 32 is further connected by a feeder 37 with the mold cavity 3.

On the other hand, the adjustment nozzle may also be used in the other direction so that the L-shaped channel 34 can convey melt from one secondary extruder to a main extruder from which the melt can be returned through the channel 35 into the channel 32 and into the mold cavity 3.

The above-described nozzles 20 and 30 ensure a particularly simple implementation of the above-described processes in view of their compact structure and can easily be placed, instead of existing single-pass nozzles, upon injection molding devices, such as extruders or plunger-type injection molding devices, so that the latter can be retrofitted without any complex structural modifications for application of the process according to the invention.

Thus, the adjustment nozzles 20 and 30 permit the use of different flow paths simply by controlling the injection molding device.

## CLAIMS

1. Process for injection molding of injection molded parts from plasticizeable material, including injecting into an injection mold (2) a first plasticized material which hardens on the edge of the mold, and subsequently injecting into the injection mold (2) a second plasticized material which differs from the first one, characterized in that only the second plasticized material is moved during solidification.
2. Process according to claim 1, characterized in that the second plasticized material is moved in only one direction.
3. Process according to one of the preceding claims, characterized in that the movement is generated through ultrasound.
4. Process according to one of the preceding claims, characterized in that an electromagnetic field acts upon the second plasticized material.
5. Process according to one of the preceding claims, characterized in that the movement is generated by a melt pump.

1 6. Process according to one of the preceding claims, characterized in that the  
2 second plasticized material is injected from two locations, at least partially at  
3 a same time, into the injection mold (2).

1 7. Process according to one of the preceding claims, characterized in that a  
2 sheet or a reinforcement fabric is placed before or after injection of the  
3 plasticized material into the injection mold (2).

1 8. Process according to one of the preceding claims, characterized in that the  
2 first material covers only a portion of the wall surface of the injection mold.

1 9. Process according to one of the preceding claims, characterized in that after  
2 partial filling of the injection mold (2) with the first material, a further region  
3 of the injection mold is opened by means of a slide gate for subsequent  
4 filling with the second material.

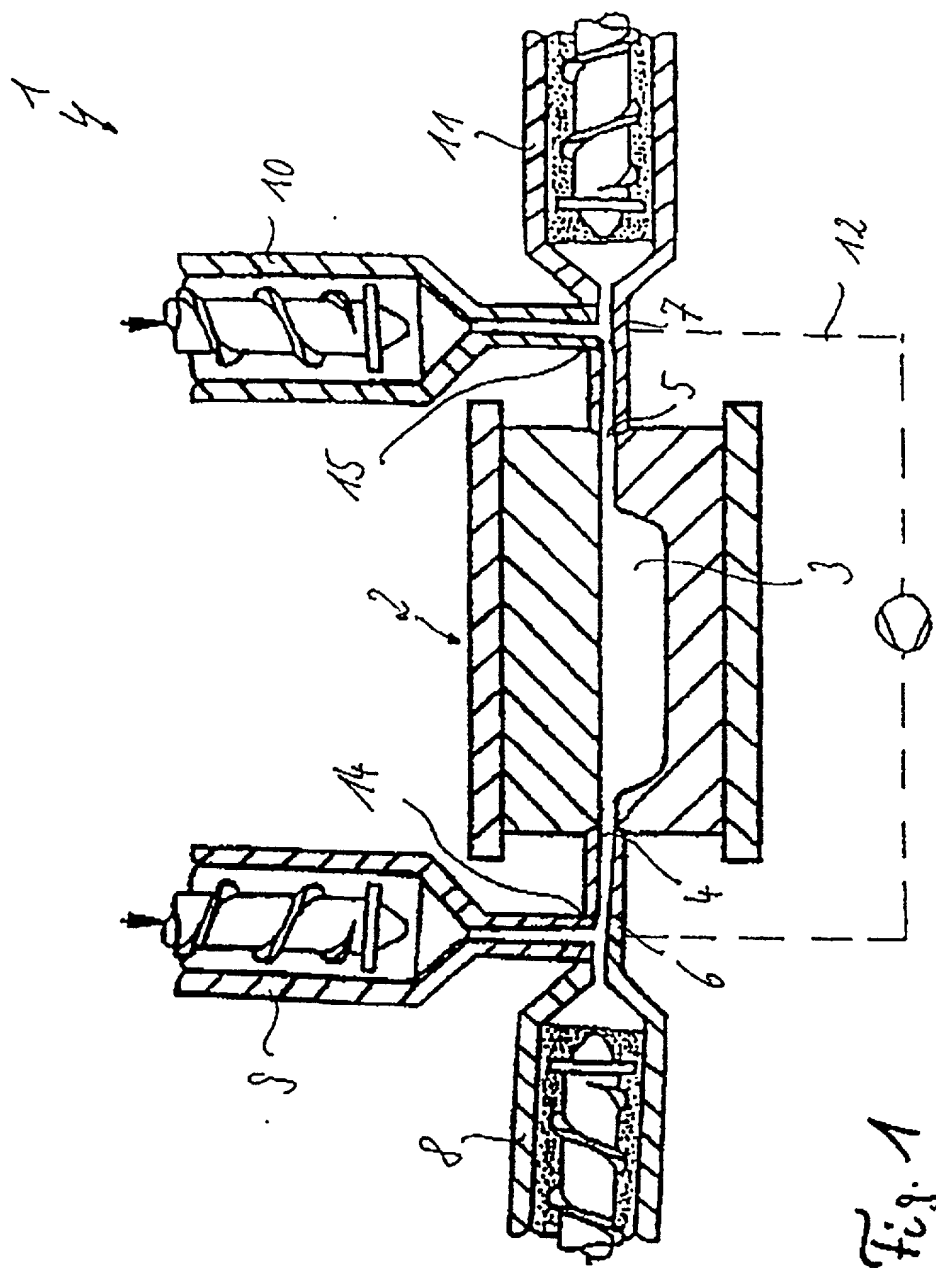
1 10. Process according to one of the preceding claims, characterized in that at  
2 least a further plasticized material is injected before injection of the first  
3 plasticized material.

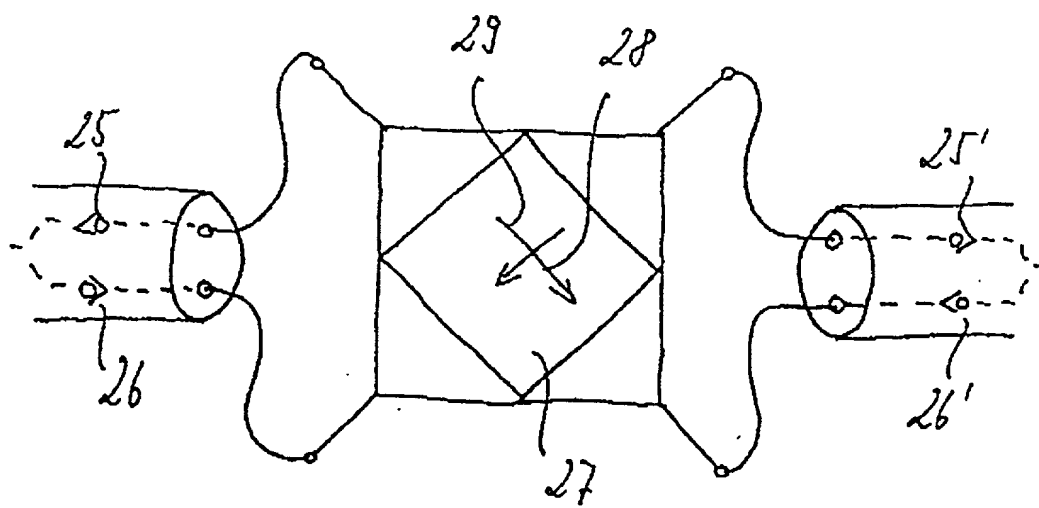
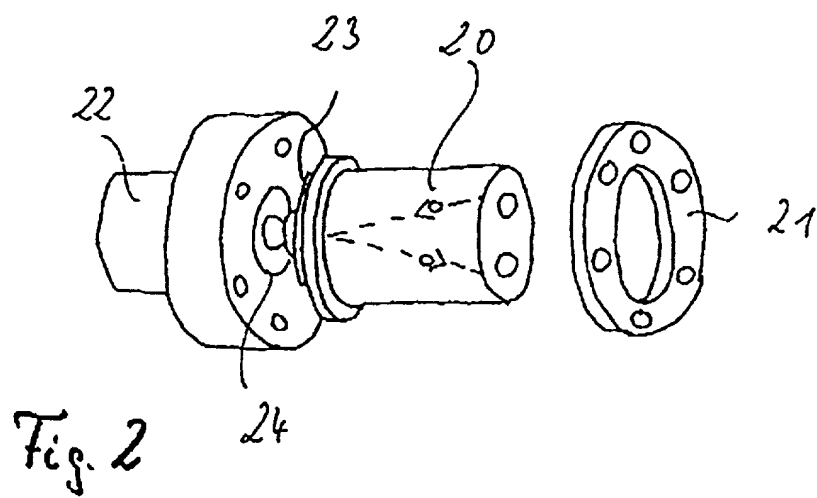
1 13. Injection molding device according to claim 12, characterized in that the  
2 adjustment nozzle (31) has various channels (34, 35) and is movably guided  
3 in a block (30), so that one channel (34, 35) of the adjustment nozzle (31) is  
4 in alignment with a channel (32) in the block (30).

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## ABSTRACT

Initially, a first plasticized material is injected into an injection mold and, once this material has hardened on the edge, a second plasticized material is injected into the injection mold and only the second plasticized material is moved during solidification. In this manner, an increased strength of the injection molded part is realized.





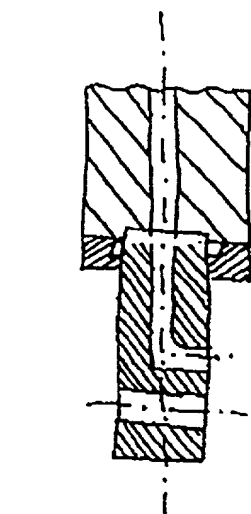


Fig. 5

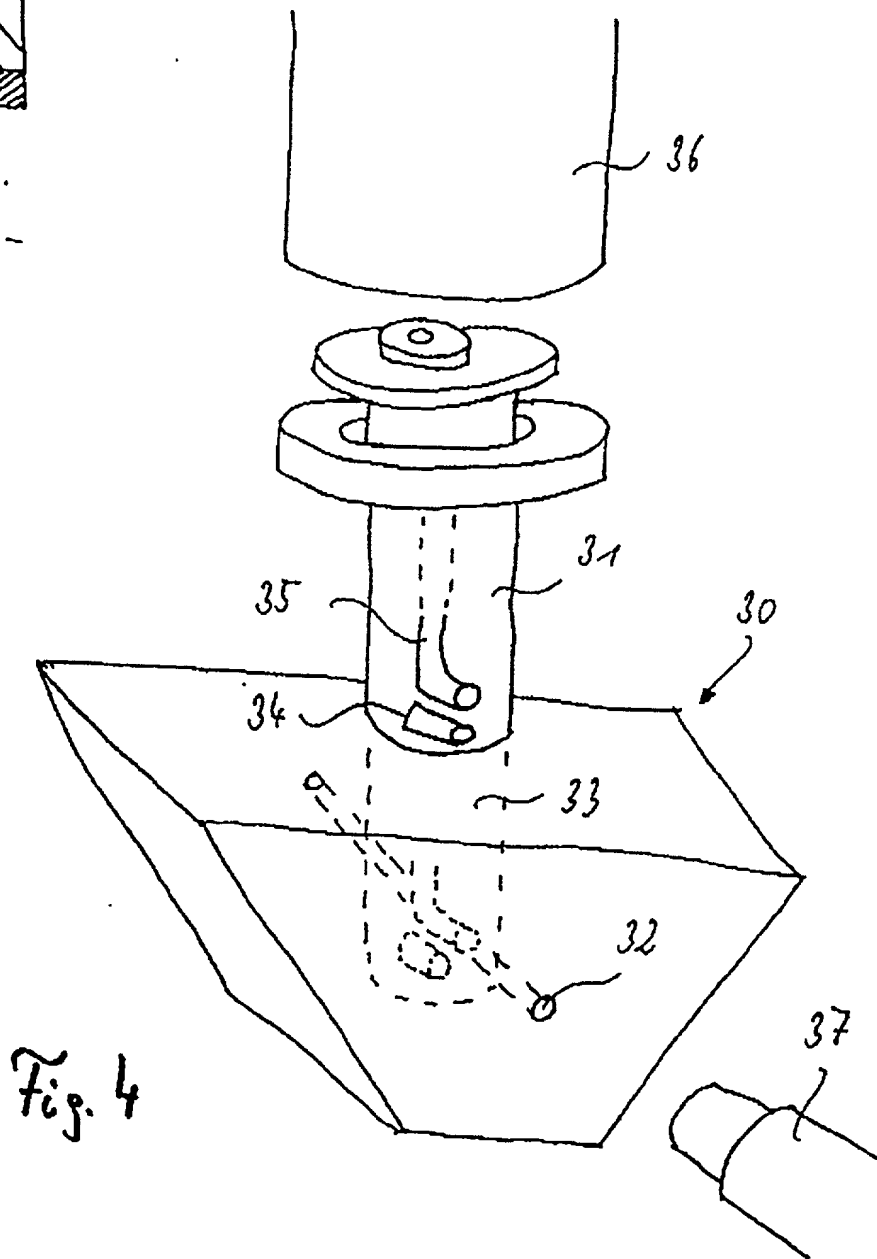


Fig. 4

PO 1000 US  
30 MAY 2000  
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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION  
Erklärung für Patentanmeldungen mit Vollmacht  
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

daß ich, nach bestem Wissen, der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

**VERFAHREN UND VORRICHTUNG ZUM  
SPRITZGIESSEN VON SPRITZGUSSTEILEN  
AUS PLASTIFIZIERBAREM MATERIAL**

deren Beschreibung  
(zutreffendes ankreuzen)

- ☐ hier beigefügt ist.  
☒ wurde angemeldet am 21. August 1998  
unter der U.S.-Anmeldungs Nr. oder unter der  
Internationalen Anmeldenummer im Rahmen des  
Vertrags über die Zusammenarbeit auf dem  
Gebiet des Patentwesens (PCT)  
PCT/DE98/02448 und am  
\_\_\_\_\_ abgeändert (falls  
zutreffend).

Ich bestätige hiermit, daß ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag, wie oben erwähnt, abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen an, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Titel 37, Code of Federal Regulations, §1.56 von Belang sind.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Titel 35, US-Code, §119(a)-(d), bzw. §365(b) aller unten angegebenen Auslandsanmeldungen für ein Patent oder Erfinderurkunden, oder §365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslandsanmeldungen für Patente oder Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND DEVICE FOR INJECTION  
MOLDING PLASTIFIABLE PARTS**

the specification of which  
(check one)

- ☐ is attached hereto  
☒ was filed on 21 August 1998  
as United States Application Number or PCT  
International Application Number  
PCT/DE98/02448, and was  
amended on \_\_\_\_\_  
(if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications  
(Frühere ausländische Anmeldungen)

Priority Claimed?  
Priorität beansprucht?

197 36 371.7      Germany  
(Number)      (Country)  
(Nummer)      (Land)

21/August/1997  
(Day/Month/Year Filed)  
(Tag/Monat/Jahr eingereicht)

☒ [ ]  
Yes      No  
Ja      Nein

198 08 145.6      Germany  
(Number)      (Country)  
(Nummer)      (Land)

27/February/1998  
(Day/Month/Year Filed)  
(Tag/Monat/Jahr eingereicht)

☒ [ ]  
Yes      No  
Ja      Nein

Ich beanspruche hiermit gemäss Titel 35, US-Code, §119(e), den Vorzug aller unten aufgeführten US-Hilfsanmeldungen

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) below

60/076 472  
(Application No. / Anmeldendr.)

2/March/1998  
(Filing Date / Anmeldedatum)

(Application No. / Anmeldendr.)

(Filing Date / Anmeldedatum)

Ich beanspruche hiermit gemäss Titel 35, US-Code, §120, den Vorzug aller unten aufgeführten US-Patentanmeldungen bzw. §365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung, bzw. PCT internationalen Anmeldung in einer gemäß dem ersten Absatz von Titel 35, US-Code §112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, §1.56 von Belang sind und im Zeitraum zwischen dem Anmeldedatum der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) gültigen internationalen Anmeldedatum bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Appl. No.)  
(Anmeldendr.)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig  
aufgegeben)

(Status)  
(patented, pending  
abandoned)

(Appl. No.)  
(Anmeldendr.)

(Filing Date)  
(Anmeldedatum)

(Status)  
(patentiert, anhängig  
aufgegeben)

(Status)  
(patented, pending  
abandoned)

Ich erkläre hiermit, daß alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und daß ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, daß wissentlich und vorsätzlich falsche Angaben gemäss §. 1001, Titel 18 US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können, und daß derartig wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

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00486018-050300

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**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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Reg. No. 31,084

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Voller Name des einzigen oder  
ursprünglic. en Erfinders

Full name of first inventor

HEINER BECKER

*Henry Feiereisen*

15.03.2000

Unterschrift des Erfinders

Datum

Inventor's Signature

Date

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